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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/917,842	07/27/2001	Barry L. Chin	5017/ISM/CORE MCVD/SB	3573

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APPLIED MATERIALS, INC.
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EXAMINER	
KOSOWSKI, ALEXANDER J	

ART UNIT	PAPER NUMBER
2125	11

DATE MAILED: 11/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/917,842	CHIN ET AL.	
	Examiner	Art Unit	
	Alexander J Kosowski	2125	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 November 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 July 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *10*.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

1) Claims 1-19, as amended 11/3/03, are presented for examination. This application is now an RCE.

Claim Rejections - 35 USC § 112

2) The 112 rejection of claim 4 from the previous office action is hereby withdrawn in light of the amendment filed 11/3/03.

Claim 17 recites the limitation "the wafer" in line 6. There is insufficient antecedent basis for this limitation in the claim.

Claim 17 recites the limitation "the substrate support" in line 8. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections – 35 USC § 103

3) The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4) Claims 1, 3, 5-9, 13-15, 17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nath et al (U.S. Pat 4,423,701), further in view of Okase et al (U.S. Pat 6,497,676).

Referring to claim 1, Nath discloses an apparatus comprising a deposition chamber, wherein the deposition chamber is divided into two or more deposition regions that are integrally connected to one another, whereby a wafer is moveable between the two or more interconnected

deposition regions (col. 7 lines 67-68 and col. 8 lines 1-46 and Figure 4, whereby individual wafers may be moved between connected deposition chambers). However, Nath does not explicitly teach a wafer support disposed in the deposition chamber, wherein the wafer support is vertically moveable between the two or more interconnected deposition regions.

Okase teaches an apparatus comprising a deposition chamber wherein a wafer support is vertically moveable to elevate or de-elevate a wafer to be processed (col. 4 lines 38-63).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize a vertically moveable wafer support disposed in the deposition chamber to move a wafer between interconnected deposition regions in the invention taught by Nath since a vertically moveable wafer support would allow a substrate to be easily conveyed although the substantially full surface of the peripheral area of the substrate is supported, since concentration of stress on a substrate can be restrained, and since a thermal process can be conducted uniformly within a surface of a substrate because heating from a peripheral area of the substrate may be restrained by utilizing a built-in heater in such a supporting body (Okase, col. 2 lines 5-11 and lines 29-31).

Referring to claim 3, Nath discloses a heater wherein the heater is adapted to control the temperature of the wafer support (Abstract, whereby heating elements warm the substrate to a desired temperature).

Referring to claims 5-6, Nath discloses that the deposition regions are integrally connected with an aperture and that the aperture is sealed to minimize the intermixing of deposition gases between the regions (col. 8 lines 47-68 and col. 9 lines 1-8, whereby a "gas gate" is considered an aperture).

Referring to claims 7-9, Nath discloses the apparatus shown above. However, Nath does not explicitly teach a gas supply panel coupled to the deposition chamber, nor gas lines which couple the gas supply panel to the deposition chamber, nor a gas exhaust pump coupled to the deposition chamber.

Okase teaches an apparatus comprising a deposition chamber coupled to a gas supply panel via gas lines (col. 3 lines 42-50, whereby a gas port would be connected to a supply system via a line), and comprising a gas exhaust pump coupled to the deposition chamber (col. 3 lines 42-50).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize a gas exhaust pump in the apparatus taught by Nath since an exhaust pump would allow gases to be removed from the processing tube (Okase, col. 3 lines 45-47) and to utilize a gas control panel and gas supply lines in the apparatus taught by Nath since this would allow the introduction of process gas and / or inert gas into the processing tube (Okase, col. 3 lines 42-43).

Referring to claim 13, Nath discloses that the first and second deposition regions may be vertically stacked (col. 7 lines 62-66).

Referring to claims 14-15, Nath discloses first and second orifices for providing process gas to first and second deposition regions (col. 7 line 51 through col. 8 line 19 and Figure 4, whereby it is noted than an orifice is needed in each deposition chamber to supply gas) and that the first orifice may be disposed vertically above the second orifice (col. 7 lines 62-66, whereby the deposition regions may be vertically stacked and therefore the orifices would be vertically disposed).

Referring to claim 17, Nath discloses a method of depositing a material layer on a substrate comprising a first deposition region and a second deposition region, wherein the first and second deposition regions are integrally connected to one another (col. 7 line 51 through col. 8 line 19 and Figure 4), depositing a first monolayer on a wafer in the first deposition region, moving the wafer to the second deposition region, and depositing a layer on the wafer in the second deposition region (col. 7 line 67 through col. 8 line 2 and col. 8 lines 36-40, whereby individual wafers may be moved between connected deposition chambers). However, Nath does not explicitly teach positioning a substrate on a wafer support in the deposition chamber, nor elevating the wafer positioned on the substrate support to the second deposition region.

Okase teaches an apparatus comprising a deposition chamber wherein a wafer support is vertically moveable to elevate or de-elevate a wafer to be processed (col. 4 lines 38-63).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize a vertically moveable wafer support disposed in the deposition chamber to move a wafer between interconnected deposition regions in the invention taught by Nath since a vertically moveable wafer support would allow a substrate to be easily conveyed although the substantially full surface of the peripheral area of the substrate is supported, since concentration of stress on a substrate can be restrained, and since a thermal process can be conducted uniformly within a surface of a substrate because heating from a peripheral area of the substrate may be restrained by utilizing a built-in heater in such a supporting body (Okase, col. 2 lines 5-11 and lines 29-31).

Referring to claim 19, Nath discloses that first and second gases are introduced into the first and second deposition regions (col. 6 lines 34-47 and col. 7 line 67 through col. 8 line 2, whereby it is noted that each deposition region contains a distinct gas).

5) Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nath and Okase as shown above, further in view of Matsukawa et al (U.S. Pat 5,518,542).

Referring to claim 2, Nath and Okase disclose the apparatus shown above. However, they do not explicitly teach a piston coupled to the wafer support for moving the wafer support between the two or more interconnected deposition regions.

Matsukawa teaches a wafer support whereby a piston is used to raise and lower the wafer (col. 7 lines 39-46).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize a piston coupled to the wafer support in the apparatus taught by Nath and Okase since using a piston in conjunction with a wafer support allows the wafer to be moved to multiple vertical positions (Matsukawa, col. 7 lines 39-54). In addition, the elevating mechanism used by Okase comprises a ball screw "or the like" (Okase, col. 4 lines 55-56). It is noted that using a piston is a well known alternative to utilizing a ball screw for lifting a platform.

6) Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nath as shown above, further in view of Okase, further in view of Doering et al (U.S. Pat 6,387,185).

Referring to claim 4, Nath and Okase disclose the apparatus shown above. However, they do not explicitly teach that the wafer support is an electrostatic chuck.

Doering teaches a deposition apparatus whereby a wafer in a processing chamber may be secured via an electrostatic chuck (col. 9 lines 48-51).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize an electrostatic chuck in the apparatus taught by Nath and Okase since clamping a substrate to an electrostatic chuck prevents backside deposition of the substrate (Doering, col. 7 lines 21-24).

7) Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nath and Okase, further in view of Sherman (U.S. Pat 5,916,365).

Referring to claim 18, Nath and Okase disclose the method above. However, they do not explicitly teach depositing a second monolayer on the wafer in the first deposition region.

Sherman teaches a chemical vapor deposition apparatus whereby multiple monolayers are deposited in a single deposition region (col. 5 lines 9-33).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to deposit multiple monolayers in a single deposition region in the method taught by Nath and Okase since this would allow a film of a desired thickness to be grown (Sherman, col. 5 lines 20-21).

8) Claims 10, 11, 12 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sherman (U.S. Pat 5,916,365), further in view of Nath, further in view of Okase.

Referring to claim 10, Sherman discloses a method of depositing a material layer on a substrate comprising positioning a wafer on a wafer support in a deposition chamber (col. 5 lines 62-63), introducing a first deposition gas into the chamber wherein a first monolayer of the deposition gas is chemisorbed onto the surface of the substrate (col. 6 lines 27-33), then exhausting the first deposition gas and introducing a new deposition gas into the chamber whereby a first monolayer of a second deposition gas is chemisorbed on the first monolayer of

the first deposition gas (col. 6 lines 33-41), and repeating these steps until a material layer having a desired thickness is achieved (col. 6 lines 42-43). However, Sherman does not explicitly teach that the deposition chamber comprises two deposition regions nor that the wafer support is capable of changing elevations between said regions for each deposition stage.

Nath teaches an apparatus comprising a deposition chamber, wherein the deposition chamber is divided into two or more deposition regions that are integrally connected to one another wherein a wafer is moveable between the two or more interconnected deposition regions (col. 7 lines 67-68 and col. 8 lines 1-46 and Figure 4, whereby individual wafers may be moved between connected deposition chambers).

Okase teaches an apparatus comprising a deposition chamber wherein a wafer support is vertically moveable to elevate or de-elevate a wafer to be processed (col. 4 lines 38-63).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to move the wafer support shown by Sherman between interconnected deposition regions in order to accomplish multiple stages of deposition since this would allow successive layers to be deposited on a substrate (Nath, col. 3 lines 33-36) and since moving the wafer support between multiple regions would allow for quicker deposition than the process of introducing a gas, completely exhausting said gas, introducing a second gas, and repeating.

Therefore, it also would have been obvious to one skilled in the art at the time the invention was made to utilize a vertically moveable wafer support disposed in the deposition chamber to move a wafer between interconnected deposition regions in the invention taught by Sherman since a vertically moveable wafer support would allow a substrate to be easily conveyed although the substantially full surface of the peripheral area of the substrate is

supported, since concentration of stress on a substrate can be restrained, and since a thermal process can be conducted uniformly within a surface of a substrate because heating from a peripheral area of the substrate may be restrained by utilizing a built-in heater in such a supporting body (Okase, col. 2 lines 5-11 and lines 29-31).

Referring to claim 11, the claim varies from claim 10 in that it claims a software routine executed on a computer storage medium rather than a method. The rejected method of claim 10 could inherently be executed via a software routine on a computer storage medium. Therefore, referring to claim 11, see rejection of claim 10 above.

Referring to claim 12, Sherman discloses the executable software routine above. However, Sherman does not explicitly teach changing the elevation of the substrate support.

Okase teaches an apparatus comprising a deposition chamber wherein a wafer support is vertically moveable to elevate or de-elevate a wafer to be processed (col. 4 lines 38-63).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize a vertically moveable wafer support disposed in the deposition chamber to move a wafer in the invention taught by Sherman since a vertically moveable wafer support would allow a substrate to be easily conveyed although the substantially full surface of the peripheral area of the substrate is supported, since concentration of stress on a substrate can be restrained, and since a thermal process can be conducted uniformly within a surface of a substrate because heating from a peripheral area of the substrate may be restrained by utilizing a built-in heater in such a supporting body (Okase, col. 2 lines 5-11 and lines 29-31).

Referring to claim 16, see rejection of claim 12 above.

Response to Arguments

9) Applicant's arguments in the amendment filed 11/3/03 are rendered moot in view of the new rejection above.

Conclusion

10) The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Emmi et al (U.S. Pat 6,178,660) – teaches a pass-through semiconductor processing tool.

11) Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander J Kosowski whose telephone number is 703-305-3958. The examiner can normally be reached on Monday through Friday, alternating Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo Picard can be reached on 703-308-0538. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306. In addition, the examiner's RightFAX number is 703-746-8370.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

Alexander J. Kosowski
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Art Unit 2125

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